



NASA Exploring Space Challenges, where today's students are tomorrow's explorers. Encourage students to create, design, research and use technology at <http://esc.nasa.gov>.

Mission: Teacher Challenge – International Polar Year

Grade Levels: K-12 Pre- and in-service teachers

Focus Question: Can you design a scientific inquiry challenge for your students using the topic of our polar regions?

INTRODUCTION



The International Polar Year is a large scientific program focused on the Arctic and the Antarctic from March 2007 to March 2009. Why two years, you may ask? So that researchers have full and equal coverage of both the Arctic and the Antarctic for two full annual cycles from March 2007 to March 2009. The IPY effort will involve over 200 projects, with thousands of researchers from over 60 nations examining a wide range of physical, biological and social research topics. It is also an unprecedented opportunity to demonstrate, follow, and get involved with, cutting edge science in real-time. NASA's involvement in polar science is vast. From the use of satellites in space, NASA can aid scientists with monitoring the current and future health of our planet's polar regions. Continuous satellite records made possible only since the founding of NASA half a century ago are revealing where and how the poles influence global environmental change. NASA airborne and robotic technologies let scientists study extreme environments that are otherwise inaccessible. Furthermore, what NASA can learn about life in an extreme environment in our own polar regions will help us better understand the polar regions of the Moon and Mars for future exploration.

NASA recognizes that teachers are our greatest resource for reaching our youth. We need you to encourage students to pursue careers in math, science, technology, engineering and geography. Integration and Inquiry are the current methods believed to be most effective in achieving success with students. NASA Exploring Space Challenges (NASA ESC) would like to give you, the teacher, an opportunity to show your work. Perhaps you already teach a segment on the polar regions, whether in geography, earth science, biology or even physical science. Or perhaps you would like to create an activity from scratch. Either way, tool your activity into the NASA ESC template and perhaps your Challenge will be selected for next year's line-up.

Teachers may submit their work alone or in groups to design a Challenge. Judges will select the best Challenge (s) per each grade category (K-2, 3-5, 6-8, and 9-12). One winning Challenge(s) will be used by NASA ESC for the next school year. Credit will be given to the author of the selected Challenge.

CHALLENGE REQUIREMENTS

Pre-Challenge Requirements

1. **Online teacher registration.** A teacher can register by emailing nasa-esc@nasa.gov. Each registered participant will receive a packet of NASA materials.
2. **Pre-assessment.** A brief assessment is to be completed by participants. This is for NASA ESC evaluation purposes only.

Objective One

- Review other NASA Exploring Space Challenges. Explore NASA's involvement with the International Polar Year. Try an already published activity with your students to raise their awareness of our polar regions.

Objective Two

- **Participate in a NASA Digital Learning Network event.** Currently scheduled for October, the NASA ESC will offer a 30 minute event for registered participants to learn more about Arctic science, NASA's missions for IPY, then to participate in a hands-on activity. This event will also be aired via webcast for those who do not have the capabilities to videoconference.

Objective Three

- **Write your proposal to the template! Challenges must contain the following:**
 - a. The NASA Exploring Space Challenges format must be used. (see next page)
 - b. Pre-challenge / warm-up activity
 - c. Interactive – implement a videoconference or create some other multimedia event.
 - d. NASA resources, websites and materials needed
 - e. Scoring rubrics for the appropriate grade category
 - f. Standards that incorporate a range of curricula
 - g. Pre and post assessment questions for participating students and teachers.

Post-Challenge Requirements

1. **Online submission of Challenge guide/proposal.** Participants can email their proposals to nasa-esc@nasa.gov.
2. **Post assessment.** A post-Challenge assessment must be completed by participants. Again, this is for NASA ESC evaluation purposes only.
3. **Certificate of participation.** Each teacher participant to successfully complete all requirements of this Challenge (including both assessments) will receive a certificate of participation.

CHALLENGE TIMELINE

Event	Date
Registration open	June 1, 2007
DLN Event / Webcast	October TBD, 2007
Proposals due	January 4, 2008
Reviews process by judges	January-February, 2008
Selection of Winner Announced	March 7, 2008

THE TEMPLATE



Grade Levels: *What grade level(s) is your activity designed for?*

Focus Question: *Please design one overall question that can be answered by following through with this activity.*

Instructional Objectives: *Please fill in three to six of your Challenge's instructional objectives.*

National Standards: Here are some example standards often covered in the NASA Exploring Space Challenges:

Science:

- *Science as Inquiry - Students should develop:*
- *Abilities necessary to do scientific inquiry*
- *Understandings about scientific inquiry*
- *Understandings about science and technology*

Math:

- *Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them*
- *Apply appropriate techniques, tools, and formulas to determine measurements*

Technology:

- *Students develop positive attitudes toward technology uses that support lifelong learning, collaboration, personal pursuits, and productivity*

Language Arts:

- *Reading for Perspective*
- *Developing research skills*

Geography:

- *How to use maps and other geographic representations, tools, and technologies to acquire, process, and report information from a spatial perspective*

Introduction/Background: *What information can you provide participants with to entice them to do this project?*

Challenge Requirements

Pre requirements - warm up activities and pre-assessment

Objectives — outlines the activity and includes interactive events.

Post requirements — collection of data, presentation of product and post-assessment.

Resources

Though many resources about our polar regions are through other government agencies (i.e. NSF) and educational institutions, this activity should use NASA resources in some format. Resources from joint collaborations with NASA are also encouraged.

Rubric: *Include a simple scoring rubric needed to grade a student's submission to your IPY Challenge.*

GENERAL RULES AND REGULATIONS FOR NASA ESC:

1. All participants must successfully register online.
2. Participation is restricted to students and teachers attending U.S. Schools (this includes U.S. possessions and schools operated by the U.S. for the children of American personnel overseas).
3. Teachers or administrators must register his/her students^a by emailing nasa-esc@nasa.gov. Include teacher name, school name, school address, number of students participating, grade level, and email address.
4. There is no limit to the number of student participants from each school.
5. Only students whose names have been submitted through his/her teacher's registration will be allowed to submit entries to the NASA ESC Challenges.
6. All students and teachers must have access to the internet in order to participate in a NASA ESC Challenge.
7. All entries are evaluated according to the published rubrics and requirements for each respective challenge. Judges' decisions are final.
8. Each registered student/class/school must submit separate entries for their respective challenge.
9. Each document submitted to the NASA ESC project office must include the student last name, or the school's name, and the challenge abbreviation in the title of the document. Please see the following examples:

Challenge	Example
Habitat Moon	YourName_HM.ppt
Moon Math	YourName_MM.ppt
Hurricanes	YourName_Hurr.doc
Teacher Challenge	YourName_TC.doc

10. All work submitted to the NASA ESC must be original and free from copyright.
11. NASA maintains the right to accept or reject any submitted work. All entries become the property of NASA and the Exploring Space Challenges.

12. Final documents for each respective challenge must be electronically submitted by their deadlines, as follows:

Challenge	Deadline	Documents
Habitat Moon	November 16, 2007	Slide presentation
Moon Math	November, 30, 2007	Slide presentation and report
Hurricanes!	November 2, 2007	Character story
Teacher Challenge	January 4, 2008	Proposal

If you encounter any difficulties, or have any questions please direct them to the NASA ESC project office at nasa-esc@nasa.gov.

^a The NASA ESC Project Office understands that some students may drop out during the course of their Challenge. If such an event occurs please notify the NASA ESC Project Office. If this event leaves a team with only one student, the student remaining in the Challenge will not be penalized and may have the choice to continue with their project of his/her own or join another team. It is the teacher's responsibility to contact the NASA ESC Project Office if any changes occur in a teams' participation status.

Specific Rules for the Teacher Challenge

1. Only pre-service teachers and in-service teachers of grades K-12 may participate.
2. Teachers intending to participate must register to nasa-esc@nasa.gov. Each registered participant will receive a packet of NASA material by mail.
3. Challenge proposals must be submitted electronically as a Word document (.doc) or Acrobat (.pdf).
4. Images embedded in the document must be given credit from the site from which it was obtained. This can be listed on a separate page.
5. NASA ESC template must be utilized. This consists of a) Target Audience, b) Focus Question, c) Learning Objectives, d) National Standards met, e) Background information, f) Pre and post assessment questions, g) Pre-lesson activity, h) Activity, i) judging rubric, j) internet resource list.
6. A NASA resource must be utilized. Resources from joint collaborations with NASA are encouraged.
7. One proposal will be selected for NASA product review for implementation into the 2008-09 year. Author of winning proposal will receive a stipend of \$1000 from the University of Maryland, Baltimore County.

INTERNET RESOURCES

These are some web-related resources for you to start with. We expect you will have your own list of resources (some of these sites may be repeated) tailored to your own challenge.

NASA's involvement with International Polar Year

<http://www.nasa.gov/IPY>

http://www.nasa.gov/mission_pages/IPY/multimedia/index.html

<http://eol.jsc.nasa.gov/IPY/>

Official International Polar Year website

<http://www.ipy.org>

NASA Press releases of interest

http://www.nasa.gov/home/hqnews/2005/jul/HQ_05175_sea_level_monitored.html

http://www.nasa.gov/mission_pages/station/science/polar_year.html

http://www.nasa.gov/mission_pages/IPY/snow/reindeer.html

Things you can do with your students now

<http://education.gsfc.nasa.gov/how/>

<http://schc.sc.edu/gopolar/ipy.htm>

<http://www.arctic.noaa.gov/education.html>

Pre-Assessment IPY Teacher Challenge 2007

Please complete this assessment before you begin work on your Challenge proposal. You will be asked to complete a post-assessment at the completion of this Challenge.

Your name:

School name:

School address:

Please select which statement is true.

My school is a NASA Explorer School.	
My school is <i>not</i> a NASA Explorer School.	

How many years of teaching experience do you have?

What subjects have you taught?

What grade level and subjects are you teaching this school year?

Use of Challenges

Have you participated in an NASA Exploring Space Challenges or any other NASA Challenge (i.e. NASA Engineering Design Challenge, STS-118 Design Challenge) before this one? If yes, please tell us which Challenge you participated in:

Teaching about the Earth's polar regions

Please select the number of days have you devoted to studying the polar regions in the past:

3 days or less	
6 – 10 days	
11-14 days	
> 2wks	

Knowledge of Earth's polar regions

How would you rate your knowledge of our polar regions and the research in those areas in the following categories, 1 being novice level and 5 being expert level.

Formation of polar ice (e.g. sea ice vs. land-fast ice)	0	1	2	3	4	5
Glaciers	0	1	2	3	4	5
Icebergs	0	1	2	3	4	5
Polynyas	0	1	2	3	4	5
Ice coring	0	1	2	3	4	5
Impact of global warming	0	1	2	3	4	5
Biology/Ecology involved in understanding	0	1	2	3	4	5
Geography involved	0	1	2	3	4	5
Related Careers	0	1	2	3	4	5
How would you rate your students' knowledge of polar regions?	0	1	2	3	4	5

Knowledge of Technology

How would you rate your knowledge of technology for learning about science in general?	0	1	2	3	4	5
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Effect in teacher's curriculum

To what extent does a polar-themed Challenge align with your curriculum standards?

Low correlation	0	1	2	3	4	5	High correlation
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Effect on use of NASA materials and resources

How much have you used NASA materials and resources in the past?

None	0	1	2	3	4	5	Several
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Effect on Colleagues

How likely is it that your colleagues will use the IPY Challenge Materials?

No chance	0	1	2	3	4	5	Extremely likely
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How likely is it that your colleagues will participate in the IPY Challenge next year?

No chance	0	1	2	3	4	5	Extremely likely
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How likely is it that your colleagues will participate in a different Challenge next year?

No chance	0	1	2	3	4	5	Extremely likely
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Thank you for taking the time to complete this survey. We are using this data to improve our Challenges. We greatly appreciate your help and feedback.